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ABSTRACT

A study focused on the use of followup data to analyze the employment and further education effects of vocational education at the secondary level in Minnesota. The data source was the Minnesota Secondary School Follow-Up system and the ninety-eight secondary schools which participated in the system and followed up students from the class of 1978. Findings from the followup data, responsive to a series of ten questions, indicated that (1) 64% of the students were engaged in paid employment and 14% were attending postsecondary vocational schools approximately one year after leaving school; (2) 77% took at least one vocational education course; (3) students who take vocational education courses do differ from those who do not; (4) the most valid definitional procedure for identifying "real" students of vocational education is to describe them in terms of amount and type of vocational education courses taken; (5) about 50% of students who take vocational education courses take less than 200 hours in one area, with only 22% taking more than 400 hours; (6) there are differences among students who take varying amounts of vocational education; (7) there is a difference in number of students taking courses in traditional program areas; (8) there are differences in students who take courses in the various areas; (9) sex of students does cause differences in employment and further education activities; and (10) some effects of secondary vocational education include the indication that more time spent in a particular program influences the decision to enter occupations or further education programs related to the selected vocational program area. (YLB)

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Measuring the Employment and Further Education Effects of Secondary Vocational Education in Minnesota

by

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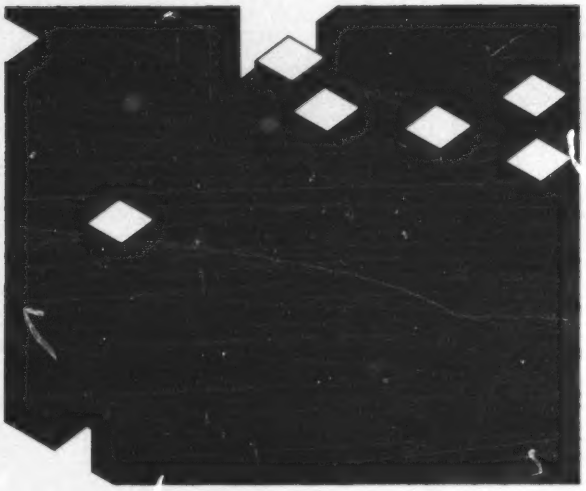

SEPTEMBER, 1980

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PREFACE

Impetus for putting together the data and thoughts portrayed in this report came from rather negative editorials on secondary vocational education which appeared in the Washington Post and New York Times newspapers in late 1979 and early 1980. Some of these editorials were subsequently carried by other newspapers including the St. Paul Dispatch/Pioneer Press. The original intent was to prepare a prompt response to the editors of these newspapers. It was found that the task was much more complex than first anticipated. So, nine months later and after much "soul searching", review of computer printouts, and constructive comments by colleagues, we have decided that our response has gone as far as it can for awhile and needs to be shared more widely. Therefore, this report is being published, not as the final answer but as a start toward some better answers about the effects of secondary vocational education programs.

We wish to thank our co-workers Donald Irvin and Nagi Salem who helped us to think through and draft some of the earlier versions of this report. We appreciated the critical review of drafts of the report by Ronald Dreyer, Barbara Gutheil, Edgar Persons, Delores Pospesel, Brandon Smith, William Stock, Thomas Strom, Janice Templin, and J. Robert Warmbrod - we think their comments helped to improve the report substantially. As the authors, we accept the responsibility for any changes which should have been made but were not. In total, this effort has been both challenging and rewarding in the insights it has provided to secondary vocational education in Minnesota; we hope we have been able to pass some of these insights on to our readers.

George H. Copa

Gary D. Forsberg

ABSTRACT

This report addresses the question, "Does secondary vocational education make a difference?". More specifically, it focuses on the use of follow-up data to analyze the employment and further education effects of vocational education at the secondary school level in Minnesota. The data source was the Minnesota Secondary School Follow-Up System and the 98 secondary schools who participated in the system and followed-up their students from the Class of 1978. Findings of the study reflect that: (1) there are several factors which serve to dampen the expectation for large, immediate effects, (2) gross classification of students as "vocational" and "non-vocational" are likely to be misleading, (3) occupational exploration as a purpose of secondary vocational education must be considered in any comprehensive evaluation of effects, (4) time in vocational education courses derived from school records is a viable means to describe exposure to vocational education, (5) there is probably not a fair control group for comparison to students taking vocational education courses, (6) the purposes of vocational education are potentially appropriate for secondary school students, (7) the effects of secondary vocational education on employment and further education of former students are in the direction expected, and (8) a definitive answer to the question of, "Does it make a difference?", even in terms of the limited measures examined in this report, is not yet possible. In summary, a call is made for a statement of specific prior expectations for secondary vocational education, with accompanying rationale, which could better serve as a "benchmark" for judging the adequacy of those effects which can be measured.

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Chapter I.
INTRODUCTION

Does vocational education at the secondary school level make a difference? This issue drew renewed attention when it was recently raised by feature writers in the Washington Post (Raspberry, 1979) and New York Times (Maeroff, 1979). A response is presented here to both the process of measuring the difference and the likely difference itself, based on experience and data analysis of student follow-up information in Minnesota. Note first the geographic delimitation -- this response is based on Minnesota data and experience; the response in other states may be different and is left to each of them to formulate individually. Second, the introductory question asks about "making a difference." Difference in what? Vocational education may have many outcomes, both intended and unintended, only some of which can be assessed through student follow-up data. The response in this paper is delimited by its focus on only the employment and further education activities of former high school students. This response is based on only one year's data, although, more years have been analyzed and the results appear stable across years. The significance of these delimitations is important, for the question has been restated: Did vocational education at the secondary school level in Minnesota make a difference in terms of employment and educational activities one year after leaving school for the Class of 1978? This is a much more specific and restricted question than that which is stated as an introduction to this paragraph. The response provided in this report should be interpreted and generalized with this delimitation uppermost in mind.

The response is organized into four sections: context, data source, findings and interpretation, and conclusions. The context section serves to provide some background which should be useful in setting reasonable expectations for the results of follow-up information about secondary vocational education students in Minnesota. A key purpose of this section is to raise questions about what are "reasonable" employment and further education effects. The section describing the data source used in framing the response is an attempt to be very clear about data quality and definitions. This section is included in respect to the well worn phrase, "what

comes out is no better than what goes in." The third section provides the core of the response. It is organized as a series of questions -- for each question there is a set of findings and our interpretation. There are ten questions for which findings and interpretations are presented; the questions are sequenced so that the interpretations build upon one another. The final section provides conclusions about, first, the process of measuring the difference made by secondary vocational education and second, the likely difference made in Minnesota.

Chapter II.
CONTEXT FOR EFFECTS

The context in which effects must be examined will be described in terms of the purposes of secondary vocational education, secondary vocational education as only part of a high school program, the process by which students decide what to do immediately after high school, and the labor market faced by students after leaving high school.

SECONDARY VOCATIONAL EDUCATION: Purpose in Minnesota

Vocational education at the secondary school level in Minnesota has three major purposes. The purposes are:

1. In-depth exploration of occupations to assist in the career planning process, and
2. Development of occupational competencies designed to be recognized for advanced placement in post secondary programs, and
3. Development of occupational competencies necessary to enter an occupation. (Minnesota Department of Education, 1978)

Only the latter two purposes are directly addressed in this report. Occupational exploration is addressed only to the degree it was influential in the selection of employment or further education.

In practice, the relative importance of the above purposes to the teachers who deliver the programs and students who attend them is evident in a recent study of secondary vocational education in Minnesota (Edin, 1979). A sample of 135 teachers in 19 secondary vocational centers, one mode of program delivery in Minnesota, were asked to rate the primary importance of the three goals -- occupational exploration, preparation for advanced training, and placement in a job. The percent of teachers rating each goal as most important was 60.6, 25.2, and 7.7 percent, respectively. Six and five-tenths percent of the sample gave no response (p. 177). Note the relatively high importance given to occupational exploration as contrasted to placement in a job. Similar information was compiled in the study from

3,590 students enrolled in the secondary vocational education programs taught by these teachers. When students were asked what the most important reason was for their attending secondary vocational centers, the responses were: prepare for a job (22.3%), prepare for further education and/or training (27.4%), wanted to explore different occupations (18.5%), wanted to get out of traditional courses (8.9%), wanted to try something new (14.9%), wanted to be with friends (0.8%), and no specific reason (5.0%). Two and three-tenths percent of the sample gave no response (p. 101). Note again that only about 50 percent of the students indicated that their most important reason for attending vocational education programs at secondary vocational centers was to prepare for a job or further education and/or training. The findings of this study are included here to support the contention that while employment and further education are important areas to examine when assessing the outcomes of secondary vocational education in Minnesota, they are by no means the only reasons why teachers and students come together in these programs.

SECONDARY VOCATIONAL EDUCATION: Part of a Larger Educational Plan

A person walking through a secondary school in Minnesota will be forced to acknowledge that there is more to the school than vocational education programs. A question which arises in evaluating the effects of secondary vocational education is how to separate out the effects of vocational education from the rest of the curriculum. In addressing these issues Warmbrod (1976) stated:

> To expect one segment of the curriculum -- instruction and experience in courses labeled vocational -- to be the major or sole factor that determines whether students get jobs or not, the level of the jobs obtained, wage level, job satisfaction, human relations skills, self-perceptions, attitudes, and work habits is an unreasonable if not naive position. To be blunt about it, we, in vocational education, have helped build a system that assigns accountability for the school's occupational preparation goal almost exclusively to what we term the vocational segment of the curriculum when, in fact, all parts of the school's program -- academic as well as vocational -- have a stake in achieving the goal of education for the world of work. (p. 9)

This point is "brought home" by considering the information presented in Table 1. A vocational education course which lasts all year and meets approximately one hour per day would result in about 180 hours of instruction

in Minnesota. This amount of time represents only about 1.5 percent of the total time available for taking courses in grades 1 through 12 and 6 percent of available time in grades 10 through 12. Some vocational education courses meet two hours per day, but even this would only amount to scarcely ten percent of the time available in grades 10 through 12. Students take other courses besides vocational education in high school and much of the course-work likely contributes to the students effectiveness in the world of work. Separating out the effects of vocational education is at best difficult and perhaps unwise.

Table 1

Vocational Education as a Percent of Total School Time Available

Time in vocational education (hours)	Percent of time in grades 1-12	Percent of time in grades 10-12
100	0.8%	3.1%
200	1.5	6.2
300	2.3	9.3
400	3.1	12.3
500	3.9	15.4
600	4.6	18.5
700	5.4	21.6
800	6.2	24.7
900	6.9	27.8

Note. Assuming 6 hours per day, 180 days per year, the total time available is 12,960 hours in grades 1-12 (3,240 hours in grades 10-12).

THE SECONDARY STUDENT: Choosing a Career or Job

Given the importance of work to the individual and the diversity of occupational choices, several theories have been developed to explain the process of career development. These theories maintain that career development is a dynamic, life-long process which can be viewed as a series of developmental stages. The transition from exploration to establishment in

an initial, full-time job takes place, for many individuals, somewhere shortly after leaving high school. The majority of those students not making the decision about a particular job are instead, choosing an educational program which often is also designed to prepare the student for some type of employment.

High school seniors are faced with intensive questioning about, "What are you going to do next year?" A study of Minnesota high school students' views of work concludes that "without a doubt, choosing a career is a difficult event for the students" (Hedin, Wolfe, Fruetel, & Bush, 1977, p. 27). They go on further to explain that rather than commit themselves to a "career" decision, students often opt for a "job" decision -- the latter being a much more "present" oriented choice and less traumatic. This attitude might be characterized as rather "casual" with respect to the thought which goes into selecting a particular job. Those individuals looking for the effects of secondary school vocational education might well be a little uneasy about justifying their impact on the bases of casual decisions made by former students during a stressful period of their development.

THE LABOR MARKET FOR YOUNG WORKERS: A World of Restricted Choices

Young workers face a labor market in which occupations available to them are restricted and in which competition is keen for even those occupations. Commenting on this context Barton (1978) concludes:

> This great homogeneity in the industrial activities of teenagers is consistent with the possibility that industry looks on young workers simply as young workers, and other matters of status do not make great differences . . . it appears that at the same time that we have been increasing the hiring of youth in service industries heavily dependent on youth labor, jobs paying around the minimum wage, and generally with the expectation that young people will move on to something else as they get older (which they mostly do), we also have been increasingly denying entry to those industries and establishments that are heavy employers of adult labor. Overly simplified, there are more and more "youth jobs" that young people hold temporarily, but fewer opportunities at ages under 20 or 21 to get into entry level jobs in larger firms with advancement structures of the kind that are manned mainly with 'adults'. (p. 9-10)

To the extent Barton is correct, quality vocational education may have little opportunity to "show-up" when looking at the employment activities

of former high school students -- especially if one looks during the period immediately after high school when students are 18 and 19 years old. This conclusion was further evidenced in the study cited earlier by Hedin, et. al. (1977) when a spot check of several employers ranging from an educational institution to a large department store and a multi-national corporation indicated that "they very rarely checked on students' high school records before hiring new high school graduates. They rely on the young person's previous work record and on their scores on batteries of tests" (p. 20).

Summary

The context serves to dampen expectations for large or perhaps even small immediate employment and further education effects from secondary vocational education programs. First, secondary programs in Minnesota have a major purpose of occupational exploration in addition to preparing for further education and job placement. Vocational education teachers and students affirm these as well as other purposes. Second, the move from high school to post high school activity such as work or more school is a traumatic time for students. They may well opt for a short range decision to do "anything" rather than face the reality of a long term commitment. And third, the occupational choices available to students just out of high school are likely to be very restricted. The consequence is that former students may become employed in the same types of occupations regardless of their general ability and specialized training. A challenge in measuring the effects of secondary vocational education is choosing a measure(s) which is sensitive enough to show differences in the above described context and yet is important enough to be worth the effort of measuring.

Chapter III.
DATA SOURCE AND QUALITY

The data reported here were supplied by the Minnesota Secondary School Follow-Up System (Forsberg and Irvin, 1979). For the last five years this system has assisted and coordinated the activities of more than 90 high schools each year in Minnesota in studying the post high school activities of their former students. The system is managed by Donald Irvin as an effort of the Minnesota Research and Development Center for Vocational Education (MRDC) at the University of Minnesota under contract with the Minnesota Department of Education, Division of Vocational-Technical Education.

Data Gathering Process

The specific data used in this report were collected by 98 Minnesota public high schools from students of the Class of 1978. The MRDC provided: (1) training to school staff in follow-up procedures, (2) data collection instruments, (3) "trouble shooting" assistance during data collection, and (4) school and state reports. Data from former students were collected by mailed questionnaires with telephone follow-up during April and May following the year in which students left high school. All former students from the selected graduating class were followed-up.

Type of Data

Two basic types of data were gathered about former students through the follow-up system. The first set of data was taken from permanent high school student records. These data include: sex, class rank, aptitude test scores and time spent by the students in each of 18 curricular areas during grades 10-12. The second set of data was collected directly from former students and concerns their employment and further education activities during the first year after high school. The description of post high school activities includes: employment status, job title, job duties, industry wages, educational status, type of school, and educational major. The two sets of data are combined in a way which allows consideration of post high school

activities in light of student characteristics and high school program.

Data Representation

The data used in this report were gathered from 17,904 students in the Class of 1978 by the 98 participating high schools. This number of students amounts to approximately one-fourth of the total students in the Class of 1978 in public institutions in Minnesota (about 68,400 students). There were an additional 4,190 graduates from private secondary schools in Minnesota in 1978. The representativeness of the volunteer sample of participating schools of all public secondary schools in Minnesota was analyzed in several ways including size of schools and geographic location of schools.

Table 2 shows a comparison of the participating schools and all public secondary schools in terms of the number of graduates as an indicator of size of school. As is apparent, the sample appears to be very similarily distributed among size categories to that for all schools. Table 3 provides information to make a similar comparison in terms of geographic location of schools. It appears, from Table 3 that the Minneapolis/St. Paul Metropolitan Area students are over represented by about 12 percent. To investigate the likely impact of this relatively small difference in geographic representation of the sample, Table 4 shows the differences in means and standard deviations for the percent of students entering employment and further education activities from schools located in the various areas of Minnesota. While some differences are visible among geographic areas, particularly regarding entry into vocational schools and 4-year colleges and universities, the 12 percent over-representation in the sample by graduates from schools in the Minneapolis/St. Paul Metropolitan Area combined with the relatively small size of mean differences is not likely to cause any large bias in generalizing to public schools in the State from the sample. Further evidence of this conclusion is provided in Table 5 which shows that the overall percentage of former students entering various further education and employment activities has remained very stable for participating schools for the Classes for 1975, 1976, 1977, and 1978; this is the case even though about 50 percent of the schools are different from year to year. Our conclusion is that the data provided by the students from the participating schools for the Class of 1978 is sufficiently representative of students from all public secondary schools in Minnesota for the purposes of this report.

Table 2

Number of Graduates from Various Size Schools for Schools Participating in Follow-Up System and Population of Public Secondary Schools -- Class of 1978

Number of graduates from schools	Population		Sample		Differences in percent
	Number of graduates	Percent	Number of graduates	Percent	
50 or less	5,814	8.5	535	2.7	-5.8
51 - 100	7,572	11.1	1,866	9.5	-1.6
101 - 150	6,287	9.2	1,793	9.2	0.0
151 - 200	5,128	7.5	1,391	7.1	-0.4
201 - 250	4,031	5.9	1,814	9.3	+3.4
251 - 300	2,758	4.0	545	2.8	-1.2
301 or more	36,824	53.8	11,626	59.4	+5.6
TOTAL	68,414	100.0	19,570	100.0	

Table 3

Number of Graduates from Secondary Schools Located in Different Parts of Minnesota for Schools Participating in the Follow-Up System and Population of Public Secondary Schools -- Class of 1978

Location of schools[a]	Population		Sample		Differences in percent
	Number of graduates	Percent	Number of graduates	Percent	
North	19,625	28.7	3,865	19.7	-9.0
South	16,797	24.6	4,156	21.2	-3.4
Minneapolis/St. Paul metropolitan area	31,992	46.7	11,549	59.1	+12.4
TOTAL	68,414	100.0	19,570	100.0	

Note. Information on the number of graduates for each school came from the Education Statistics Section, Minnesota Department of Education.

[a]North is Economic Regions 1-5 and 7, South is Economic Regions 6 and 8-10, Minneapolis/St. Paul Metropolitan Area is Economic Region 11.

Table 4

Mean and Standard Deviation of Percent of Former Students Entering Employment and Further Education for Schools Participating in the Secondary School Follow-Up System and Located in Different Parts of Minnesota--Class of 1978

Geographic location of school[a]	Mean percent for schools	Standard deviation
Vocational school		
North	20.1	6.8
South	18.9	10.8
Minneapolis/St. Paul metropolitan area	12.5	3.8
Community college		
North	8.0	8.7
South	5.7	5.5
Minneapolis/St. Paul metropolitan area	6.6	3.8
4-Year college and university		
North	21.3	10.3
South	30.4	11.1
Minneapolis/St. Paul metropolitan area	31.7	12.4
Unemployed		
North	7.4	3.8
South	6.1	5.4
Minneapolis/St. Paul metropolitan area	5.5	2.1
Paid employment		
North	64.2	8.7
South	57.1	12.2
Minneapolis/St. Paul metropolitan area	66.9	7.2

[a]North is Economic Regions 1-5 and 7, South is Economic Regions 6 and 8-10, Minneapolis/St. Paul Metropolitan Area is Economic Region 11.

Table 5

Stability of Employment and Further Education Activities of Former High School Students Whose School Participated in the Secondary School Follow-Up System-- Classes of 1975, 1976, 1977, and 1978

Activity	Percent of students reporting activity			
	1975	1976	1977	1978
Educational				
Vocational school	12.8	13.3	13.5	14.1
Community college	9.5	7.2	7.1	7.3
4-Year college and university	27.1	31.4	30.9	29.5
Employment				
Unemployed	9.1	8.5	8.3	7.0
Homemaker	4.3	3.3	3.9	3.5
Paid employment	61.1	60.7	62.7	64.7
Paid employment, only	34.6	34.6	35.3	36.5

Note: The number of students reporting this information through the follow-up system was: 9,318 (1975), 12,476 (1976), 14,957 (1977), and 14,936 (1978).

Data Quality

In order to assure data quality in the follow-up system, a very detailed procedures manual is prepared for use by high school personnel who will be gathering the data (Irvin and Forsberg, 1980). The manual contains a step-by-step description and illustrations of the procedure to be used to collect the data. High school personnel are given a one-day training workshop on using the procedure. The use of a standardized follow-up form insures consistency in data collection. MRDC staff provide continuous telephone, and if necessary, in-person contact with schools while the data are being collected to make sure problems are resolved as they arise.

The overall response rate for students who were contacted by

participating high schools for the Class of 1978 was 80 percent with complete questionnaires and five percent with incomplete questionnaires; the non-response rate was therefore 15 percent. Information from the permanent high school records for those former students not responding to the follow-up questionnaire was available from the follow-up system. To check for response bias among the relatively small percent of non-respondents, comparisons were made between those who responded and did not respond in terms of sex and high school class rank. The results of these comparisons are shown in Table 6; they imply that non-respondents are slightly more likely to be a higher proportion male and from the lower one-fourth of the class in terms of class rank. While the percent of non-respondents is small, the small differences in the above two characteristics for respondents and non-respondents would suggest some caution in interpreting very small percentages or percentage differences for various sub-groupings of students. For example, unemployment rates are relatively small percentages and might well be influenced by sex

Table 6

Sex and Class Rank of Students Responding and Not Responding in the Secondary School Follow-Up System--Class of 1978

Characteristics	Respondents		Non-respondents		Difference in percent
	Number	Percent	Number	Percent	
Sex					
Female	7,540	51.5	998	44.4	- 7.1
Male	7,106	48.5	1,248	55.6	+ 7.1
TOTAL	14,646	100.0	2,246	100.0	
High school class rank					
Upper quarter	3,976	28.7	298	14.7	-14.0
Second quarter	3,729	26.9	436	21.4	- 5.5
Third quarter	3,501	25.3	609	30.0	+ 4.7
Lower quarter	2,637	19.1	690	33.9	+14.8
TOTAL	13,843	100.0	2,033	100.0	

and achievement level of students; therefore, some caution should be used in drawing any major conclusions from the unemployment rates shown in this report.

In an effort to check accuracy and truthfulness of student responses on the follow-up form, samples of former students were recontacted by telephone after returning their questionnaire and asked the same questions (Irvin, Russo, and Galey, 1978). Rates of correspondence in written and verbal responses have been above 93 percent. To evaluate the accuracy of data coding by high school personnel, MRCC staff have recoded samples of data gathered from school records (e.g., class rank, curriculum) and follow-up questionnaire (e.g., job title, educational major). Correspondence rates of 92 percent for school record data and 98 percent for follow-up questionnaire data were obtained.

Key Definitions

Several terms are used in this report which have a variety of meanings in different contexts, thereby substantially affecting the interpretation of findings. To minimize this problem, the Minnesota Secondary School Follow-Up System uses the following definitions.

Vocational Education Course

A course for which the high school receives any state vocational education reimbursement aids. (Note. There may be different sections of a course with the same title in the same school which are not vocational education courses using this definition because the teacher is not vocationally licensed and thereby the course does not quality for state vocational education reimbursement aid.) Vocational education courses are identified by each high school from the curriculum available to the students in their sophomore, junior and senior years. Vocational courses are categorized into the program areas of agriculture, office, distributive, health occupations, home economics, service occupations, and trade and industrial. Service occupations is a category somewhat unique to Minnesota and involves preparations for occupations such as child care, community service, fashion and apparel, food service, grooming services, and tourism. In addition to the vocational education program areas, students are described in terms of time spent in courses in other educational program areas such as English,

mathematics, and physical education.

Graduating Class of 1978

Students who were members of the graduating Class of 1978 for a particular high school. Drop-outs or earlier leavers are not included in this definition.

Amount of Time in an Educational Program Area

The amount of time a student spent in courses in each educational program area was collected from the student's high school records. In this process, directions were given to assume that a high school class period was one hour in length. For Minnesota, a year long course meeting one hour per day would then amount to approximately 180 hours of instruction. Some vocational education courses meet two hours per day; one year of this length course would be 360 hours.

High School Class Rank

In Minnesota, graduating students in each school are given a class rank based on grades received in high school courses. This rank was converted to a percentile rank in order to facilitate analysis of data about students from all schools.

Educational Activities

Educational activity is a self-report by each follow-up respondent as to the further educational activity they were engaged in at the time of follow-up. Choices were vocational school, community college, four-year college or university, apprenticeship, and other education. More than one choice was possible.

Employment Activities

Employment activity data were collected in the same way as educational activity data. Choices were paid employment, homemaking, military, and unemployed (looking for work). Again more than one choice was possible. Information was gathered on amount of time per week a former student was working; full-time employment was defined as 30 or more hours per week. Unless specifically designated, students who were classified as engaged in

paid employment include those working any amount of time per week. Since former students were allowed to indicate their involvement in several educational or employment activities, a category of "paid employment, only" is used in this report to designate former students who responded to only the paid employment activity and not to any other education or employment activity.

Homemaking is a particularly difficult category to interpret since from one perspective, everybody is a homemaker if they are taking care of at least some aspects of their food, clothing or shelter. As reflected in the follow-up system data, the definition of homemaking is very much in the "eyes of the beholder." Its inclusion under the broader heading of employment is rationalized because it is viewed to be a form of work; the inclusion of homemaking as a form of employment, even though the homemaker is not paid a salary or wage is supported by an overwhelming majority of Minnesota residents (Copa and Maurice, 1978). Unemployed as a category again depends on the perception of the former student. The question was asked using the phrase "unemployed (looking for work)." The overall unemployment rate in Minnesota at the time of the follow-up study was four percent (Minnesota Department of Economic Security, 1980); no specific rate for young people was available.

Chapter IV.
FINDINGS AND INTERPRETATIONS

The contents of this section is our response to the issue of measuring the effects of secondary school vocational education on the post high school employment and further education activities of former students. The response is provided in answer to a series of questions Each question consists of findings from follow-up data from the Minnesota Secondary School Follow-Up System and our interpretation of that data.

Question 1: Can Vocational Education Potentially Be Useful at the Secondary School Level?

This question is stated in a particular way; it does not ask if it is useful, only could it be useful. The data shown in Table 7 indicate that 64.1 percent of the students in the Class of 1978 in Minnesota were engaged in paid employment approximately one year after leaving high school. Forty-one and one-tenth percent are working full-time. Thirty-five and five-tenths are working at paid employment, only, and do not perceive themselves as doing other things such as going to school. Also, 3.3 percent of the former students indicated that they are employed as homemakers. Perhaps most relevant to the further education purpose of secondary vocational education, 14.2 percent of former students are attending post secondary vocational schools.

These data support the response that vocational education could be useful at the secondary school level. Later questions posed in this report will more specifically address the question of, "How is it useful?"

Question 2: What Proportion of Minnesota High School Students Take Vocational Education Courses Sometime During Their Last Three Years of High School?

For the Class of 1978, 77.6 percent took at least one vocational education course during the last three years of high school as shown in Table 8. That means a "wide" majority of students take some vocational education; by and large, these students will tend to reflect (and, in fact, be a dominant influence on) the general characteristics of the students in total.

Table 7

Employment and Further Education Activities of Students After Leaving High School in Minnesota--Class of 1978, One Year Later

Activity	Percent[a]
Educational	
Vocational school	14.2
Community college	7.6
4-Year college or university	30.9
Employed	
Paid employment	64.1
Full-time	41.1
Part-time	23.0
Paid employment, only	35.5
Military	3.4
Homemaker	3.[illegible]
Unemployed	6.[illegible]

[a]Percentages are of the total number of students for which data were available--16,271. Percentages cannot be added across categories because students may be doing more than one activity (e.g., employed and going to school).

Question 3: Are There Differences in the Students Who Take Vocational Education Courses and Those Who Do Not?

Differences were examined in terms of the characteristics of sex ratio, class rank, post high school employment activities and post high school educational activities as shown in Table 8. Differences are in the direction one would tend to anticipate. A smaller proportion of students taking vocational education courses are in the upper quartile in class rank and in terms of post high school activities, a larger proportion are in vocational school and in paid employment. The proportion in paid employment and not engaged in other activities, such as going to school or homemaking, is particularly large relative to students who did not take vocational education courses.

Table 8

Students Taking And Not Taking Vocational Education in Minnesota High Schools -- Class of 1978, One Year Later

Characteristic	Total	Students taking vocational education	Students not taking vocational education
Summary data			
Number	16,271	12,619	3,652
Percent[a]	100.0	77.6	22.4
High school rank percentile (%)[b]			
In upper 25%	26.9	21.5	45.8
In lower 25%	20.9	24.0	10.2
Sex (%)[b]			
Female	50.5	55.1	34.8
Male	49.5	44.9	65.2
Educational activity after one year (%)[b]			
Vocational school	14.2	16.1	8.0
Community college	7.6	6.9	10.0
4-Year college	30.9	23.6	54.9
Employment activity after one year (%)[b]			
Paid employment	64.1	67.8	51.9
Unemployed	6.8	6.5	7.9
Paid employment, only	35.5	40.6	18.5
Homemaking	3.3	3.9	1.0

[a] Percentages are of the total number of students for which data were available -- 16,271.

[b] Percentages are of the total number of students in the respective columns-- 16,271, 12,619, and 3,652.

Our interpretation is that these two groups of students are quite different in terms of the characteristics studied. They are certainly not reasonable control or comparison groups for each other. However, even if the students in these two groups were the same in their characteristics, it would still not be reasonable to use them as comparison groups. This conclusion is only reinforced when the groups are as different as reflected in the findings presented here. The reason the comparison is unreasonable regardless of student characteristics is that students are likely to be in different courses for different reasons and the purposes of the courses are also likely to be different. In sum it makes little sense to compare "apples and oranges" if one is really interested in "apples", no matter how the apples and oranges are similar or different.

Question 4: Who is a "Real" Student of Vocational Education?

There are several ways to approach the decision of who to identify as a student of vocational education. In the past, national studies have generally relied on the former students' perception of whether or not they took vocational education courses and if it was a major focus of their high school program (Fetters, 1975; Andrisani and Kohen, 1975). It seems the first source of concern and likely error is defining vocational education. For the data source used in this report, vocational education is those courses offered in Minnesota secondary schools for which the school is receiving vocational education aids. The next logical question is, "How many such courses must be taken to qualify for the designation as 'student of vocational education'?" Or, one might choose to depend on student intent and ask the student, "What was the primary purpose of the courses you took in high school?" If the primary purpose was to explore kinds of work or learn a job or trade, the student might be termed a student of vocational education.

Table 9 shows the results of the latter approach used with a sub-sample of the students for which data were available from the Minnesota Secondary School Follow-Up System for the Class of 1978. At the end of their senior year, these students were asked to respond to the statement:

The courses I took in high school were primarily related to:
(Mark only one)

_____ 1. Not specialized in any area (general education).
_____ 2. Going on to college (college prep).
_____ 3. Exploring kinds of work (vocational exploration).
_____ 4. Learning a job or a trade (vocational training).
_____ 5. Art, drama, music (fine arts).
_____ 6. Other _____.
_____ 7. None of the above.

As is apparent from Table 9, the largest percentage of students did not perceive their high school courses as being specialized in any one area.

Table 9

Purpose of Courses Taken in High School as Perceived by a Sub-Sample of High School Seniors in Minnesota -- Class of 1978

Purpose	Number	Percent
Not specialized in any area	1,542	37.8
Going on to college	1,292	31.6
Exploring kinds of work	411	10.1
Learning a job or a trade	545	13.3
Art, drama, music	104	2.5
Other	146	3.6
None of the above	43	1.1
TOTAL	4,083	100.0

Considering the objectives of vocational education in Minnesota as listed previously, the purpose of "exploring kinds of work" and "learning a job or a trade" fit most closely to the original intent of identifying students of vocational education. In total, students listing these two primary purposes for their high school courses amount to 23.4 percent.

With the data on hours of time in vocational education courses in grades 10-12, it is possible to verify if, in fact, the students who indicated the purpose of their high school courses as exploring kinds of work and learning a job or trade did take vocational education courses and the amount taken.

Table 10 shows a tabulation of students' perceived primary purpose of high school courses and whether or not they took vocational education courses. The percentages listed on the diagonal of the matrix shown in Table 10 might be viewed as verified classifications -- that is, the students viewed the purpose of their high school courses as relating to the purposes of vocational education and they did take vocational education or conversely, the students' perceptions of the primary purpose of their high school courses were not one of the purposes of vocational education and they did not take vocational education courses. The other two cells in the matrix represent misclassification using the above rules. The data indicate that 42.5 percent of the students (20.9 + 21.6) represent what would have been expected, while 57.5 percent were potentially inconsistent. The largest share of inconsistant cases was for students who perceived the primary purpose of high school courses as other than the purpose of vocational education and yet took some vocational education courses. This group may not be totally inconsistent because there were about 37 percent of the students who indicated their high school courses were not specialized in any one area.

Table 10

Perceived Purpose of Courses Taken in High School and Taking Vocational Education Courses for a Sub-Sample of High School Seniors in Minnesota -- Class of 1978

Perceived purpose of high school courses	Took at least one vocational education course	Did not take any vocational education course
Consistent with vocational education purposes[a]	20.9	2.5
Other purposes[b]	55.0	21.6

[a] Includes exploring kinds of work and learning a job or a trade.

[b] Includes not specialized in any area, going on to college, art, drama, music, and other.

In order to closer examine the relation between perception of purpose of high school courses and amount of vocational education courses taken, the consistency of the relationship explored above was analyzed with consideration of amount of vocational education courses taken. The expectation was that the more vocational education courses taken, the more likely students were to perceive the primary purpose of their high school courses as being related to the purposes of vocational education. Table 11 shows the resulting data by increments of 100 hours of vocational education courses. As amount of time in vocational education courses increased from 1-100 hours to 801-900 hours, the percent of students who indicate the purpose of their high school courses was consistent with two of the objectives of vocational education increased from about 25 percent to slightly over 50 percent. At the same time, the percent of students who indicate the purpose of their high school program was not primarily consistent with these two objectives of vocational education, yet took vocational education courses, decreased from almost 75 percent to slightly less than 50 percent. This data appears to indicate that amount of time in vocational education courses is directly related to perceived purpose of high school courses. However, there still seems to be considerable error in relying on students' perceptions. The amount of time in vocational education courses of 801-900 hours represents about 25 percent of available time in grades 10-12. Yet, with this relatively large proportion of time in vocational education courses, the chance is about 50/50 that students will indicate the primary purpose of their high school courses as being consistent with the two objectives of vocational education able to be studied with this data.

Our interpretation of this finding, even though based on a sub-sample of schools participating in the follow-up system, is that caution should be used in relying on student perceptions or information when trying to identify who is a student of vocational education. It is likely that students do not classify their high school courses as a whole with a high degree of accuracy in relationship to the primary purpose of the courses taken, at least for vocational education courses. It may well be that students simply do not know which courses carry the label vocational and which do not, especially given the definition of vocational education used in the Minnesota Secondary School Follow-Up System. The error is probably especially prevalent for students in home economics courses (which may not

Table 11

Perceived Purpose of Courses Taken in High School and Amount of Time in Vocational Education Courses for a Sub-Sample of High School Seniors in Minnesota -- Class of 1978

Amount of time in vocational education courses	Perceived purpose of high school courses	
	Consistent with vocational education purpose	Other purposes
1 - 100 hours	25.7%	74.3%
101 - 200 hours	26.5	73.5
201 - 300 hours	25.5	74.5
301 - 400 hours	35.3	64.7
401 - 500 hours	29.4	70.6
501 - 600 hours	37.2	62.8
601 - 700 hours	45.5	54.5
701 - 800 hours	57.7	42.3
801 - 900 hours	53.3	46.7

be thought of as being job related) and office courses (which may be job oriented but may not qualify for vocational education aids and therefore, are not defined as vocational education in this report).

Further, the largest share of high school students in Minnesota probably do not have one, primary purpose to their high school courses. Rather, students are taking courses for a variety of purposes and the mix of courses taken would be more likely characterized as comprehensive rather than specialized.

Given the results of the analysis focused on the question of, "Who is a "real" student of vocational education?", it was concluded that the most valid definitional procedure is to describe students in terms of the amount and type of vocational education courses taken rather than relying on a single criterion for who is a vocational student. Second, in view of the likely inaccuracies in student perceptions, it seems important to obtain information on courses taken directly from school records. This procedure and source of information was used for the information present in the remaining part of this report.

Question 5: How Much Secondary School Vocational Education Do Students Experience?

First, it is evident from Minnesota data, as shown in Figure 1, that about 50 percent of the students who take vocational education courses for varying amounts of time take less than 200 hours in any one of the seven areas of vocational education--agriculture, office, distributive, home economics, health, service, trade and industrial. The table in Appendix A serves as the basis for Figure 1. The total on which this percentage is based is a special way of counting students. In the total, students are counted once for each different amount of vocational education they had taken in the different program areas. Therefore, if the student had taken 180 hours of agriculture courses and 360 hours of office courses, he or she would be counted once in the 101-200 hours and once in the 301-400 hour categories of amount of vocational education. On the other hand, if the student had taken 180 hours of courses in agriculture and 180 hours in office, then the student would be counted only once in the 101-200 hour category. As can be seen, even the mere description of amount of time students spend in vocational education is a complex process.

Using this counting procedure, only 22 percent of the students taking vocational education courses take more than 400 hours of coursework in a single program area. Our interpretation is: (a) if there are different expectations and actual findings for post high school employment and education activities based on amount of time in a given vocational education area, and (b) if there is an uneven distribution in the proportion of students taking varying amount of vocational education, then it makes even less sense to group all students under one label called vocational education when examining the effects of secondary vocational education. The data in Figure 1 show that, in fact, the second "if" statement made above is true, students do take a varying amount of vocational education.

What is the expected effect of less than 100 or 200 hours of vocational education? From Table 1, this amounts to 3 to 6 percent of total school time available in grades 10 through 12. To interpret this amount of education in full-time equivalents (assuming 6 hours per day as full-time), 200 hours is equivalent to five weeks of training. Is a substantial employment and further education effect for this amount of vocational education, given the measures used, reasonable? We think not, given that this time may be

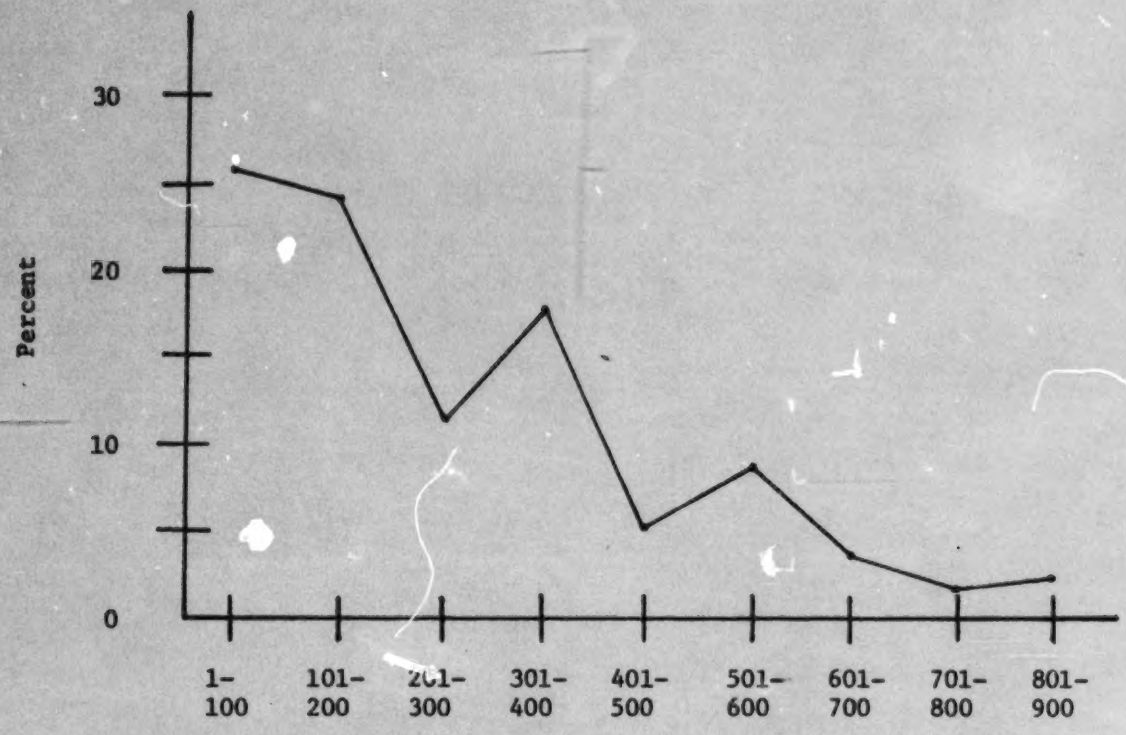

Figure 1. Percent of students taking various amounts of vocational education in Minnesota high schools -- Class of 1978.

Note. This graph is drawn from the data shown in Appendix A. Observe that students are counted in a special way in this figure. Students are counted once for each different amount of vocational education which they had taken in a different program area. Therefore, if a student had taken 180 hours of agriculture courses and 360 hours of office courses, he or she would be counted once in the 101-200 hour and once in the 301-400 hour categories of amount of vocational education. On the other hand, if the student had taken 180 hours of agriculture courses and also 180 hours of office courses, the student would be counted only once in the 101-200 hour category (because the amount of time remained within the same category even if it was taken in two different program areas).

integrated with other courses over a three year period and the characteristics of the students and the labor market they face at this time in their lives.

Question 6: Are There Differences Among Students Who Take Varying Amounts of Vocational Education?

The answer is "yes" in terms of each of the student characteristics being studied. Figure 2-4 show the change in student characteristics as time in a single vocational education program area increases from 100 hours to 900 hours (Appendix A serves as the basis for Figure 2-4). Again, our interpretation is that the characteristics change as would be expected. That is, as hours of vocational education increase, students are, in general, more likely to be lower in class rank, going to vocational school, working at paid employment, and less likely to be going to four-year colleges or universities. Both of the considerations mentioned in response to Question 5 have therefore held. The distribution in proportions of students taking different amount of vocational education is uneven and there are differences in the characteristics among students taking varying amounts of vocational education. This evidence suggests that it is unreasonable to group all students taking vocational education courses in one category and treat them as if they were all the same. To average across the group would highly bias the results in favor of the high frequency sub-group of students taking a relatively small amount of vocational education.

Question 7: Is There a Difference in the Number of Students Who Take Vocational Education Courses in the Traditional Program Areas?

There is considerable variance in the proportion of students taking courses in each of the traditional vocational education program areas as can be seen in Figure 5. The range is from 72 percent of all students taking vocational courses take home economics to 4 percent in health occupations courses. Summing the percentages shown in Figure 5 results in a sum greater than 100; this is a result of the same students taking courses in more than one vocational education program area. The proportion of students taking courses in more than one program area is at least 35 percent.

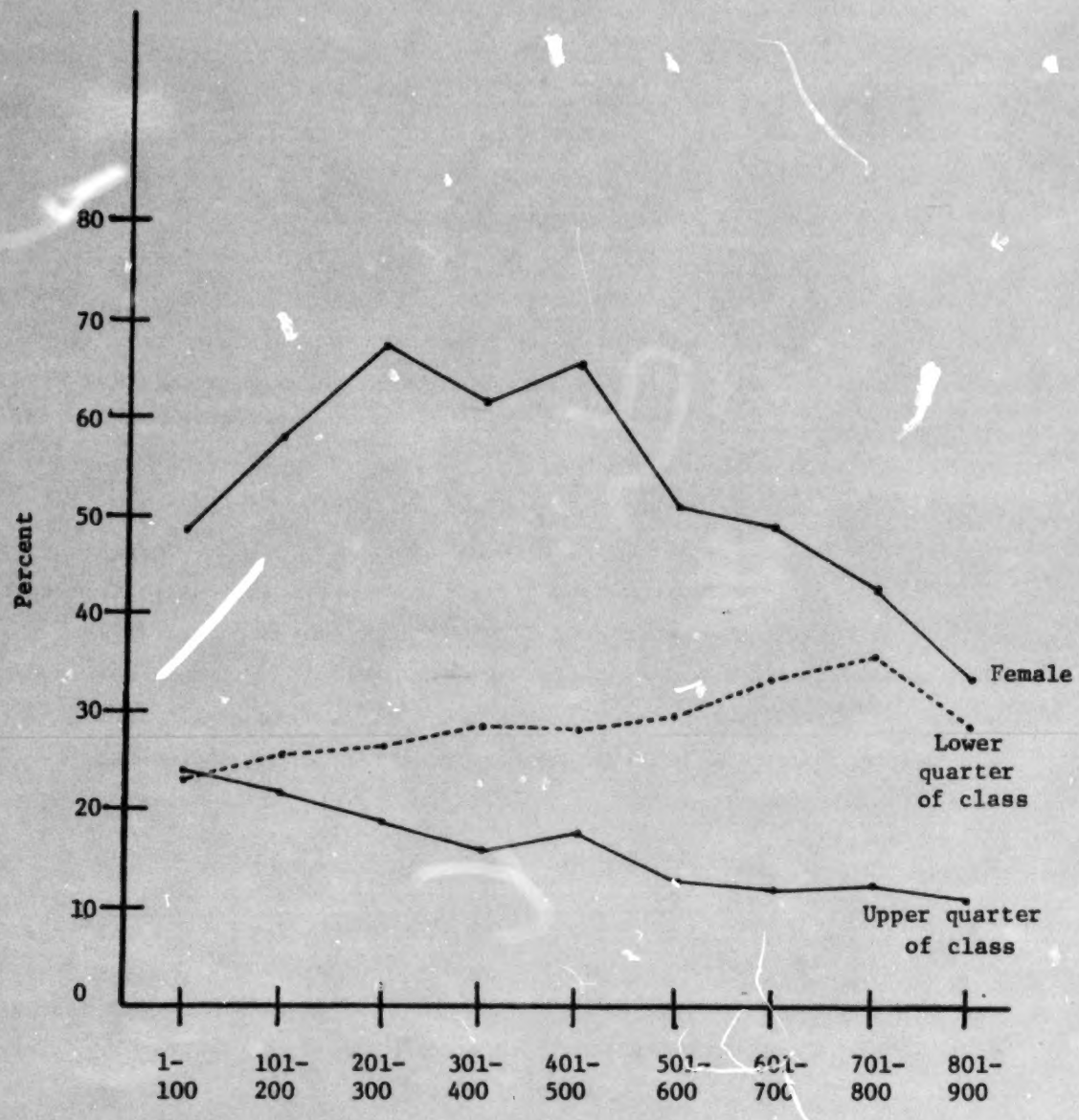

Figure 2. Difference in sex ratio and class rank of students taking various amounts of vocational education in Minnesota high schools--Class of 1978.

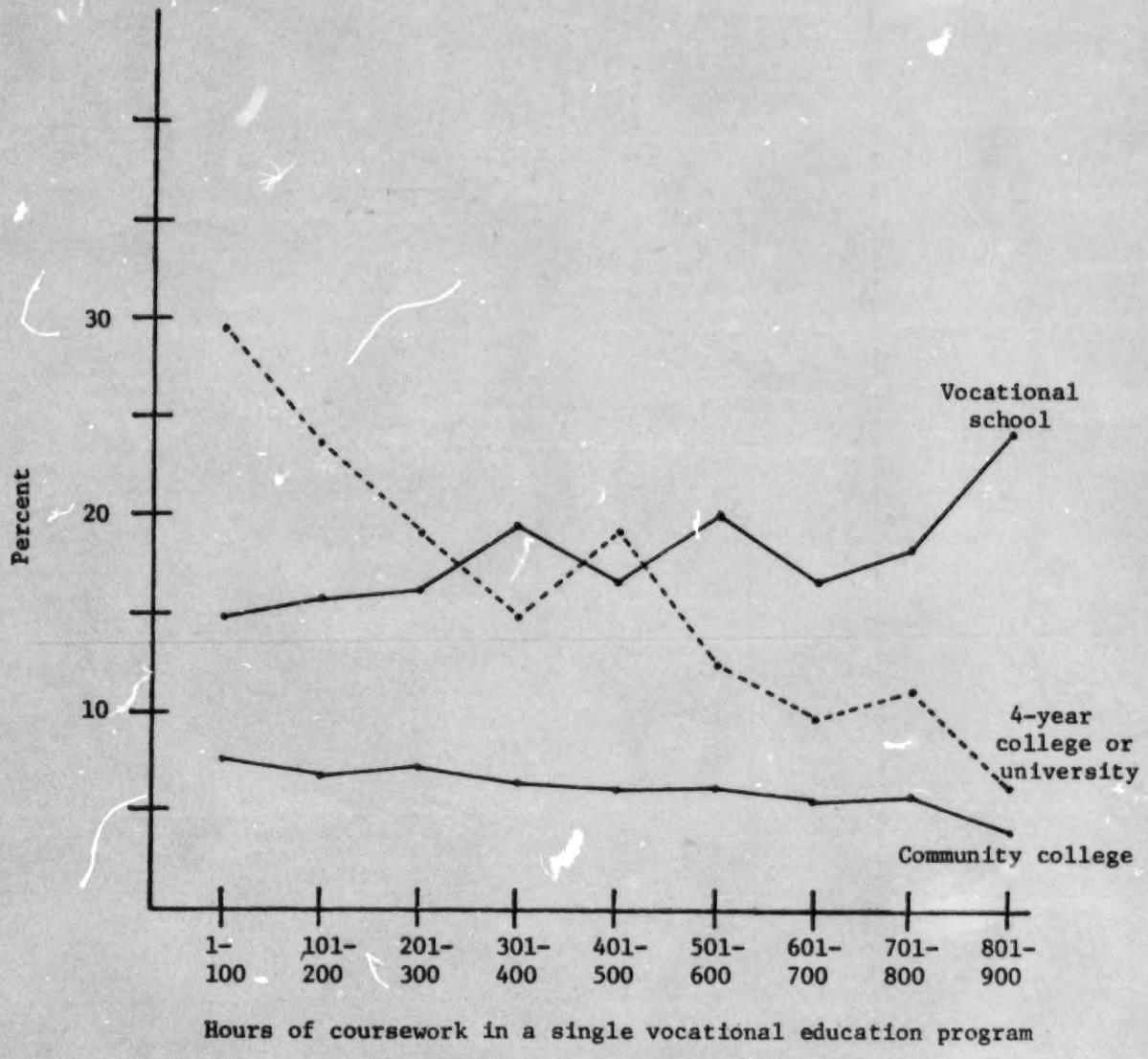

Figure 3. Differences in post high school educational activities of students taking various amounts of vocational education in Minnesota high schools -- Class of 1978.

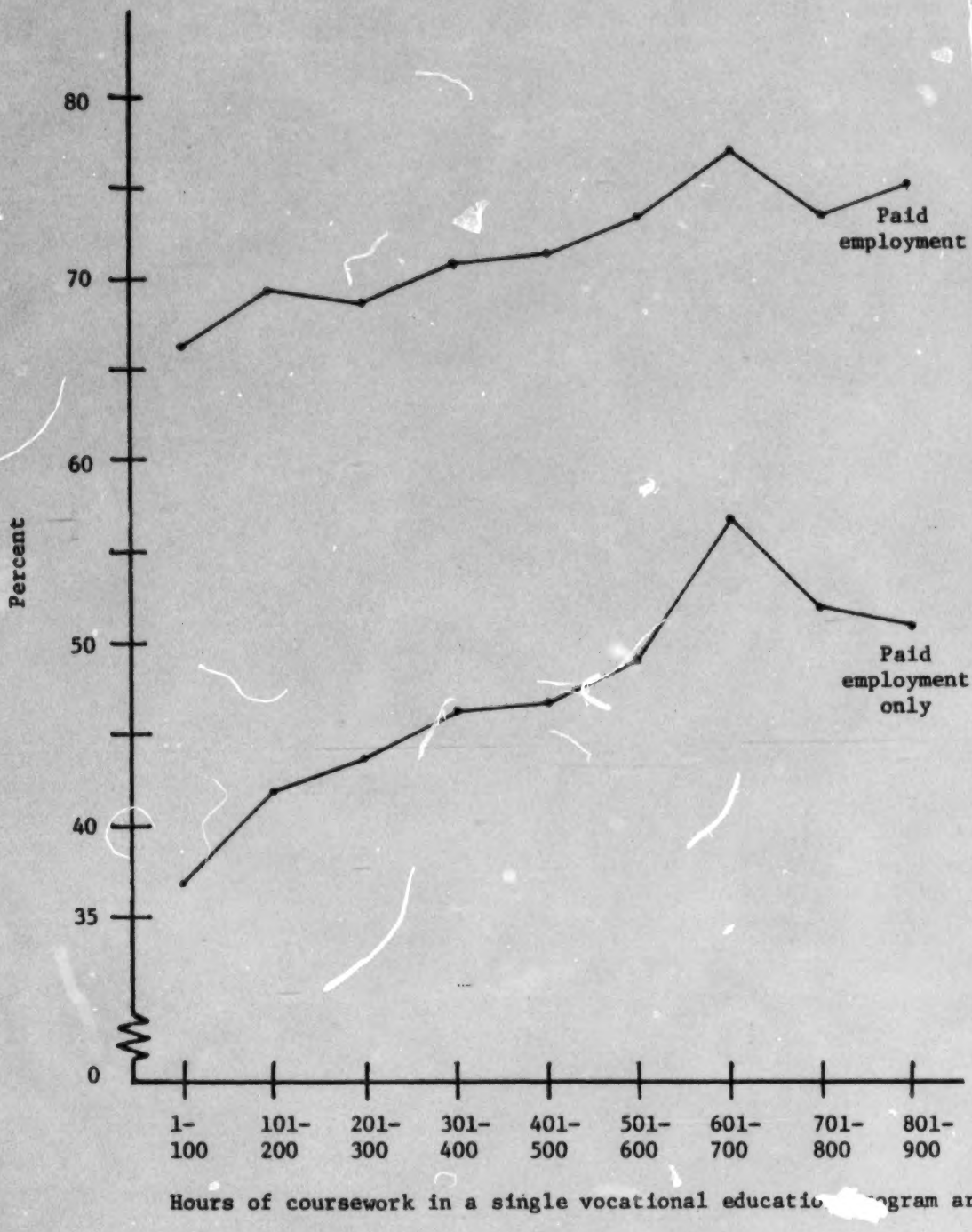

Figure 4. Difference in post high school employment activities of students taking various amounts of vocational education in Minnesota high schools -- Class of 1978.

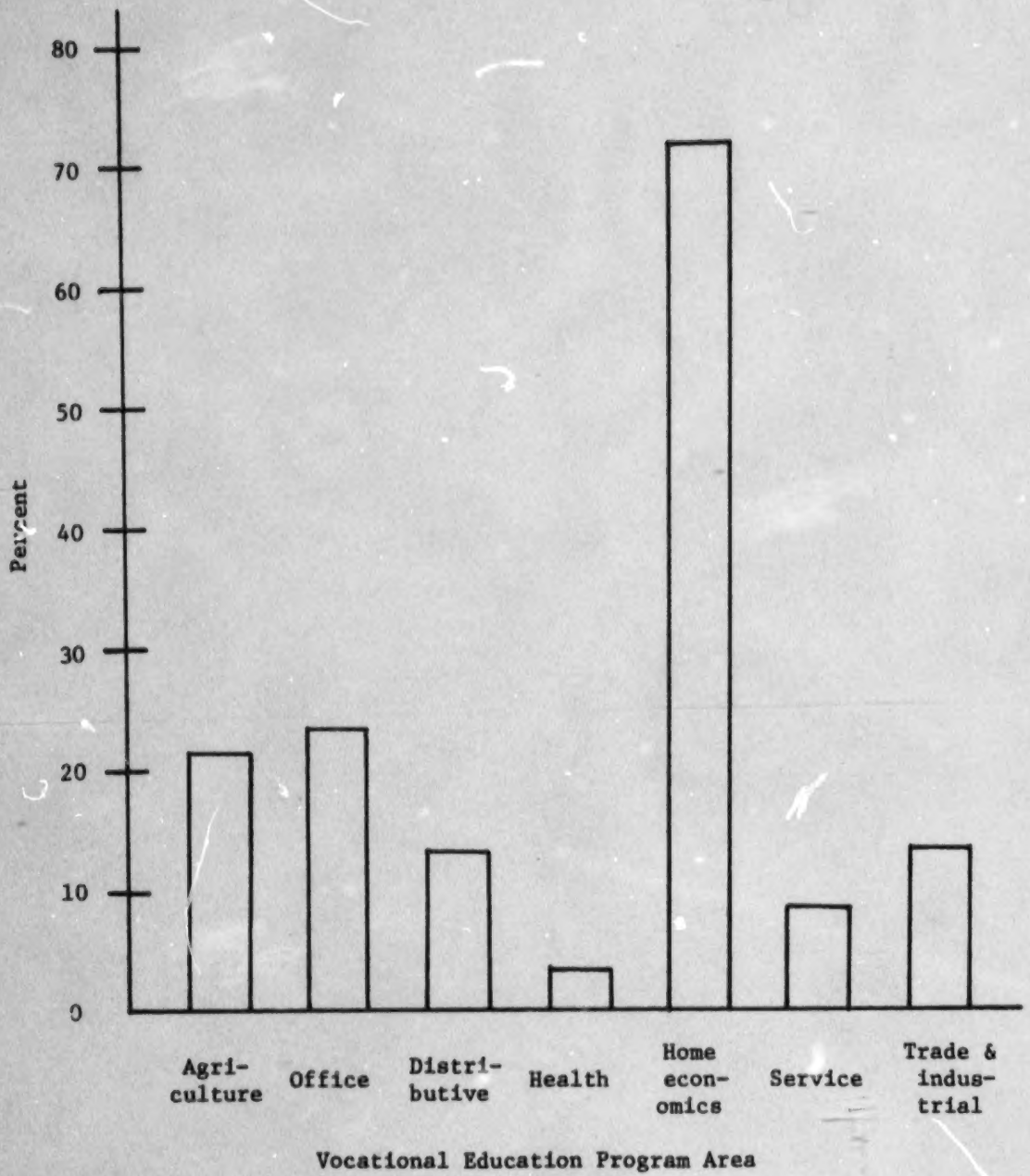

Figure 5: Percent of students taking vocational education courses who take courses in each traditional vocational education program area in Minnesota high schools -- Class of 1978.

Our interpretation is that simply combining all students taking vocational education courses regardless of vocational education program area is an unreasonable strategy. Results are very likely to be biased in favor of students taking home economics courses, if there are major differences in characteristics between students taking courses in each program area. Further, the extend of multiple course enrollments makes it difficult to place students in mutually exclusive program categories at the secondary school level. Recall that this overlap may be a desired feature given secondary school vocational education's purpose of occupational exploration.

Question 8: Are There Differences in Students Who Take Courses in Each of the Vocational Education Areas?

As would probably be expected, again, the response is "yes" as shown in Table 12. Contrast office occupations courses where 78 percent of the students are female and 25 percent are in the upper 25 percent of the class, with trade and industrial courses where 16 percent are female and only 9 percent are in the upper 25 percent of the class. In terms of educational activities, 23 percent of students taking trade and industrial courses are in vocational schools, contrasted with 13 percent of those taking distributive courses. Moving to four-year colleges and universities, 23 percent of those taking home economics courses are enrolled compared to 9 percent of students taking trade and industrial courses. Findings about employment activities show other differences. Of those students taking trade and industrial education, 76 percent are engaged in paid employment (52 percent paid employment, only), while 63 percent of those taking health occupations courses are working at paid employment (35 percent paid employment, only). Our interpretation is that these findings provide even more evidence that it is not useful to treat all students taking vocational education courses as one homogeneous group.

Question 9: Are There Differences in the Employment and Further Education Activities of Female and Male Students?

As shown in Table 13, there are important differences in characteristics and post high school activities of female and male students. While approximately equal numbers of the total group of students (combining those taking and not taking vocational education courses) are female and

Table 12

Students Taking Courses in Different Vocational Programs in Minnesota High Schools -- Class of 1978

Characteristics	Vocational education program						
	Agri-culture	Office	Distri-butive	Health	Home econ-omics	Service	Trade & Indus-trial
Summary data							
Number	2732	3014	1737	574	9521	1049	2182
Percent[a]	20.6	22.7	13.1	4.3	71.8	7.9	16.4
High school rank percentile (%)[b]							
In upper 25%	14.8	25.0	13.2	17.8	20.7	20.6	8.7
In lower 25%	34.5	18.1	31.7	25.7	25.4	25.2	38.1
Sex (%)[b]							
Female	29.0	78.0	56.8	85.0	63.5	64.7	16.2
Male	71.0	22.0	43.2	15.0	36.5	35.3	83.8
Educational activity after one year (%)[b]							
Vocational school	17.9	17.5	13.0	16.9	15.0	14.9	22.6
Community college	5.0	7.0	5.0	9.1	6.8	4.4	3.4
4-Year college	15.7	20.0	17.8	21.1	23.3	20.1	8.9
Employment activity after one year (%)[b]							
Paid employment	70.1	70.1	71.9	62.8	67.9	70.4	76.1
Unemployed	4.4	6.4	7.6	8.5	6.8	5.6	4.5
Paid employment, only	48.7	42.4	48.0	35.3	41.1	45.9	51.8

[a] Percent is of all students (graduates and early leavers) taking vocational education courses; percentages don't total to 100 percent because the same students take courses in more than one vocational education program area.

[b] Percentages are of the number of students in each vocational education program as stated in the first row of each column.

Table 13

Students of Each Sex in Minnesota High Schools -- Class of 1978

Characteristics	Female	Male
Summary data		
Number	8913	8991
Percent[a]	49.8	50.2
High school rank percentile (%)[b]		
In upper 25%	33.0	19.5
In lower 25%	16.1	29.1
Educational activity after one year (%)[b]		
Vocational school	13.4	14.8
Community college	7.8	6.9
4-Year college	31.2	27.7
Employment activity after one year (%)[b]		
Paid employment	63.7	65.7
Unemployed	8.3	5.6
Paid employment, only	34.5	38.6
Employed full-time[c]	60.6	69.9
Homemaker	6.6	0.2
Selected occupation if employed (%)[b]		
Sales	8.0	4.9
Clerical	42.6	10.8
Craftsperson	3.2	20.5
Operatives	8.2	18.5
Laborers	3.7	19.3
Farm	0.4	5.4
Service	28.8	15.0
Wages if employed ($/hour) (%)[b]		
< 1.99	2.9	1.4
2.00 - 2.99	25.5	10.6
3.00 - 3.99	51.5	36.4
4.00 - 4.99	14.6	24.3
> 4.99	5.5	27.3

[a] Percentages are of all graduates and early leavers in the sample.

[b] Percentages are of the number of females and number of males, respectively, as presented in the first row; there is an exception in the row labeled "employed full-time".

[c] Percentages are of the number of females and number of males, respectively, who are in paid employment.

male, 33 percent of the females are in the upper 25 percent of the class and only 20 percent of the males. A slightly higher proportion of males go to vocational school, are engaged in paid employment, or are working full-time. In contrast, slightly more females go to college. There are some major differences in females and males in the occupations selected for those employed and in wages received. Females are employed in much higher proportions in clerical and services occupations while males are employed in craftworker, operative, and laborer occupations. The difference in occupations is reflected in wages where 52 percent of the males are making $4.00 or more per hour as compared to 20 percent of the females.

Leaving aside the equity question, the relevance of these findings to the response presented here is that care must be taken in contrasting groups of vocational education students who vary in sex ratio when studying the employment effects of vocational education. It is perhaps not always necessary to separate students on the basis of sex, but it is important to understand that the sex of students can easily confound the results.

Question 10: What are Some Likely Effects of Secondary Vocational Education When Controlling for Vocational Education Program Area, Amount of Time, and High School Class Rank?

Findings are presented in Tables 14-16 for students taking courses in agriculture, office, and trade and industrial programs. The results are generally consistent and conform to expectations in each vocational program area. Before going further, note that the sample size in some of the columns in Tables 14-16 is relatively small; this limiting characteristic is sometimes masked when referring to percentages. Concerning the sex ratio of students and holding class rank constant, as amount of time spent in coursework increases, the percent female decreases in agriculture, increases in office, and decreases in trade and industrial. On the other hand, holding amount of time in coursework constant; the percent female is always higher for students in the upper quartile of class rank across the three vocational program areas.

The trends are not as clear when examining post high school educational and employment activities of students when class rank is held constant and amount of time in coursework increases. Rather, percentages fluctuate with students in the upper quartile of class rank and taking 401-900 hours of

Table 14

Students Taking Various Amounts of Vocational Agriculture in Minnesota High Schools--Class of 1978, One Year Later

Characteristics	Class rank: Lower ¼ of class; Amt. of voc. agri. (hrs): 1-200 hours	201-400 hours	401-900 hours	Class rank: Upper ¼ of class; Amt. of voc. agri. (hrs): 1-200 hours	201-400 hours	401-900 hours
Summary data						
Number	399	182	271	231	70	89
Sex (%)[a]						
Female	29.6	10.4	4.8	66.7	31.4	23.6
Male	70.4	89.6	95.2	33.3	68.6	76.4
Educational activity after one year (%)[a]						
Vocational school	14.0	12.2	12.0	15.7	13.4	19.3
Community college	1.3	1.4	4.9	8.8	9.0	7.2
4-Year college	3.0	0.7	4.0	45.8	35.8	39.8
Index of related major	100	120	634	240	409	1380
Employment activity after one year (%)[a]						
Paid employment	76.7	80.6	79.1	56.5	62.7	61.4
Employed full-time	84.9	89.2	94.4	51.6	64.3	78.4
Paid employment, only	61.7	67.6	69.8	23.1	34.3	28.9
Index of related occupation	100	318	614	57	666	1020

[a] Percentages are of number of students in each respective column; these numbers are presented in the first row.

Table 15

Students Taking Various Amounts of Office Education in Minnesota High Schools--Class of 1978, One Year Later

Characteristics	Class rank: Lower ¼ of class; Amts. of Office Ed. 1-200 hours	Lower ¼ of class; Amts. of Office Ed. 201-400 hours	Lower ¼ of class; Amts. of Office Ed. 401-900 hours	Upper ¼ of class; Amts. of Office Ed. 1-200 hours	Upper ¼ of class; Amts. of Office Ed. 201-400 hours	Upper ¼ of class; Amts. of Office Ed. 401-900 hours
Summary data						
Number	430	173	122	322	192	157
Sex (%)[a]						
Female	52.8	84.4	86.9	76.7	92.2	95.5
Male	47.2	15.6	13.1	23.2	7.8	4.5
Educational activity after one year (%)[a]						
Vocational school	14.1	17.0	26.0	12.8	20.9	20.6
Community college	7.9	9.5	8.3	13.1	7.7	9.2
4-Year college	7.9	5.4	4.2	46.9	31.3	24.1
Index of related major	100	177	244	119	194	215
Employment activity after one year (%)[a]						
Paid employment	71.3	71.4	68.8	59.	65.9	70.2
Employed full-time	80.4	64.7	75.8	41.9	62.4	64.9
Paid employment, only	52.1	46.3	47.9	18.6	34.1	36.2
Index of related occupation	100	338	453	590	1041	1159

[a] Percentages are of number of students in each respective column; these numbers are presented in the first row.

Table 16

Students Taking Various Amounts of Trade and Industrial Education in Minnesota High Schools--Class of 1978, One Year Later

Characteristics	Class rank: Lower ¼ of class; Amts. of Trade & Ind. Ed. 1-200 hours	Lower ¼ of class; Amts. of Trade & Ind. Ed. 201-400 hours	Lower ¼ of class; Amts. of Trade & Ind. Ed. 401-900 hours	Upper ¼ of class; Amts. of Trade & Ind. Ed. 1-200 hours	Upper ¼ of class; Amts. of Trade & Ind. Ed. 201-400 hours	Upper ¼ of class; Amts. of Trade & Ind. Ed. 401-900 hours
Summary data						
Number	124	326	275	56	72	57
Sex (%)[a]						
Female	23.4	12.9	7.6	34.5	30.6	15.8
Male	76.6	87.1	92.4	65.5	69.4	84.2
Educational activity after one year (%)[a]						
Vocational school	13.8	15.7	16.8	15.8	24.3	41.2
Community college	5.3	2.0	2.2	1.8	7.1	3.9
4-Year college	6.4	2.4	0.9	45.6	24.3	25.5
Index of related major	100	130	136	46	69	151
Employment activity after one year (%)[a]						
Paid employment	84.0	79.1	70.0	63.2	70.0	82.4
Employed full-time	80.5	90.4	90.1	47.1	63.3	52.4
Paid employment, only	62.8	62.6	63.4	24.6	30.0	31.4
Index of related occupation	100	163	244	30	82	320

[a] Percentages are of number of students in each respective column; these numbers are presented in the first row.

coursework often breaking the trend. However, there is striking consistency in trend for a new dimension added in this set of tables. The dimension is labeled as an index of related major for those going on to school and an index of related occupation for those who are working. In deriving the variables, first a sample of educational majors and occupations judged to be related to each of the vocational education program areas was selected; that is, there should definitely be some benefit from the program if a student was to select that educational major or occupation. The sample of majors or occupations was by no means intended to be exhaustive of all possible related majors or occupations. Rather, it was to be a small sample with the purpose being to develop an indicator which was sensitive to the concept of relatedness and could be used to measure relative increases in the proportion of students selecting related majors or occupations as amount of time and class rank of student varied within students taking courses in a given vocational education program area. The educational majors and occupations selected as being related to each of the three selected vocational education program areas are shown in Appendix B. The intent was not to compare students taking courses in these program areas; this was a comparison already concluded to be unreasonable. To insure that such comparisons were not made, an indexing system was used in which the index of related major or occupation of 100 was given to students taking 1-200 hours of coursework and in the lower 25 percent of their class within each program area. The values of the index for other amounts of time and class rank categories were derived in proportion to this base category. For example, if students in the category of 1-200 hours and being in the lower 25 percent of their class for a program area selected the predetermined sample of related occupations at a rate of 20 percent and another category of students in the same program area selected these same occupations at 40 percent, the index for the first group would be 100 and for the second group 200 (40/20 x 100 = 200). As already noted, the relationship of amount of time in coursework, holding class rank constant, is very direct and consistent with the index for both education and occupation. As time increases the index of selection of related educational majors, if in school, or related occupation, if working, increases. As an example, this relationship is plotted for students taking agriculture courses in Figure 6.

Considering post high school educational and employment activities of students taking courses in each of these three vocational education program

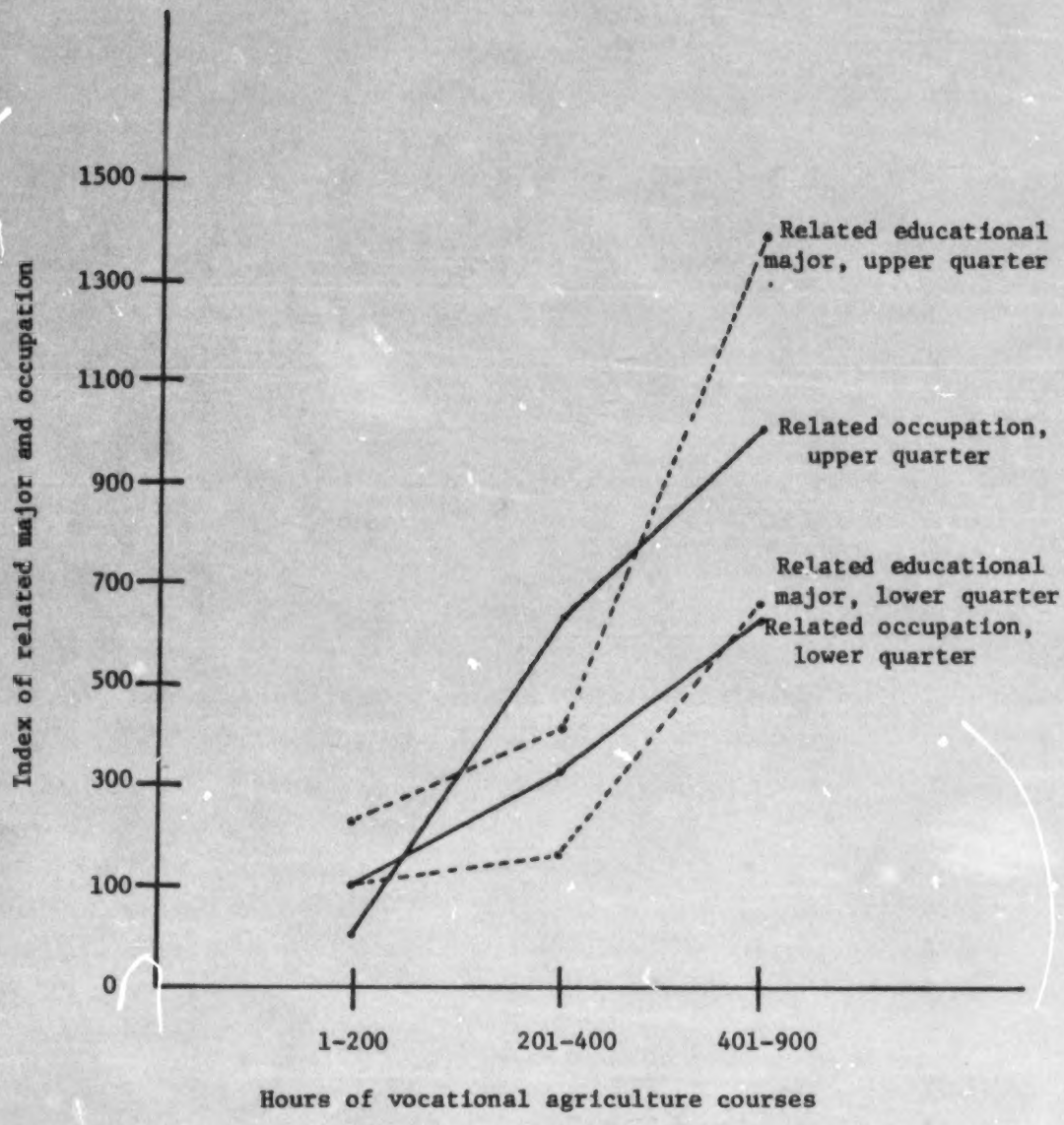

Figure 6. Change in index of related educational major and occupation in relation to increase in amount of vocational agriculture course-work.

areas from the alternative perspective of holding amount of time in courses constant and observing differences for students from the lower and upper quartile in class rank, findings are again consistent. In general, a higher proportion of the students in the upper quartile go on to school and a lower proportion are in paid employment when contrasted to students in the lower quartile; often the differences are substantial. Students from the lower quartile in class rank have, in general, lower rates of selecting related majors and occupations than those in the upper quartile, holding constant the amount of time in the vocational education program areas. The exception was in the trade and industrial area for students in the upper quartile and taking less than 400 hours of coursework.

Our interpretation of these findings is that the effects of secondary school vocational education are as would reasonably be expected given some facts about and understanding of context, students served, and amount of exposure to vocational education. It is evident that a very conscientious effort to consider context, limitations of data, and confounding factors is needed in order to "tease out" a sense of what is happening. For example, some of the relationships suggested by findings to this last question need much more investigation before they can be accepted as being caused by secondary vocational education. The striking increase in index of related educational major and occupation with increase in amount of instruction for students taking vocational agriculture may be at least partially due to the types of jobs available where vocational agriculture courses are taught or to the occupation of the students' parents. The sometimes confusing relationship for these same variables for students taking trade and industrial courses may be due to the wide diversity of courses included in this program area -- this results in imprecision when judging relatedness of post high school educational and employment activities for these students.

Further investigation might also probe whether or not students with more courses in a particular vocational area, although entering related occupations in higher proportions are better off in terms of wages and more satisfying jobs as a result of their investment in training. Or, if they entered related educational majors, did the training they already have allow advance standing or better performance in the post secondary program. There were not enough students in the sample of students available to this study to make these analyses after controlling for other variables thought to be

important, such as program, sex, and high school class rank. The reality of not having a large enough sample in view of the rather large number of students whose data were available points out that it may be almost impossible, perhaps for even the economic reasons of paying for data collection, to ever fully investigate the effects of secondary vocational education using only quantitative procedures.

Chapter V.
CONCLUSIONS

The statements which follow result from probing the question, "Did vocational education at the secondary school level in Minnesota make a difference in terms of employment and educational activities one year after leaving school for the Class of 1978?" This question was drawn from the more generic question, "Does vocational education at the secondary school level make a difference?" The conclusions are divided into two parts: first, about the process of measuring the employment and further education effects of secondary vocational education, and second, about the actual effects themselves. Each of the following conclusions is followed by a brief summary of supporting evidence.

About the Process of Measuring the Effects

- Expectations for the employment and further education effects of secondary vocational education must be tempered by considering the adverse conditions under which these effects are to take place.

  At the time students leave high school, they are in a very traumatic period of their lives. For this reason they may opt for a rather casual short-range decision to do any type of work which is readily available rather than a long-range, well thought out decision to select a job which makes maximum use of their prior training and experience and is consistent with a career plan. At the same time, the occupational choices available to people of this age are likely to be very restricted and may not allow immediate entry into jobs using the training and experience which may have been acquired. Both of these conditions would serve to dampen the expectations for large immediate employment effects from secondary vocational education.

- A student's total high school program must be considered when evaluating the effects of vocational education; gross classifications such

as "vocational" and "non-vocational" must be abandoned as largely misleading.

In Minnesota, vocational education programs are only part of the full high school curriculum available to students. Vocational education courses exist only as elective and are not required courses for students. Over three-fourths of all Minnesota high school students elect to include vocational education as a portion of their total high school educational experience. However, many of these students spend less than ten percent of their time in grades ten through twelve in vocational education courses with the balance of their time used to study other subject areas. It is very likely and desirable that study in these other subject areas interacts with the study of vocational education in substantial and complex ways to influence the employment and further education activities of students after leaving high school. Terminology such as "vocational" and "non-vocational" students fails to recognize the large overlap and interaction between types of courses taken by high school students.

- All purposes of secondary vocational education must be considered when evaluating the effects of vocational education at this level; a process must be developed to specifically focus on the purpose of occupational exploration.

  In Minnesota, secondary vocational education has the purposes of occupational exploration, preparation for further education, and preparation for employment. While the latter two purposes are important, almost two-thirds of a representative sample of teachers from secondary cooperative centers rated occupational exploration as the most important purpose in their courses. It may well be that many of the students taking a relatively small amount of vocational education were there for the purpose of occupational exploration and that purpose is adequately served in the time so spent. The evidence presented in this report does not directly reflect the effects of occupational exploration; the point of making this conclusion explicit is as a reminder of evaluative work yet to be done in order to provide a more comprehensive picture of the effects of secondary vocational education.

- Amount of time in various types of vocational education courses as recorded from high school records provides a more accurate description of exposure to vocational education then relying on students' perceptions for this information.

  This conclusion is consistent with an earlier conclusion that it is more accurate to record amount of time in various vocational education courses to obtain a picture of exposure to vocational education than to simply classify students as "vocational" and "non-vocational." The large variation in amount of time in vocational education courses along with the evidence that students often take courses in more than one vocational education area make the recording of time particularly appropriate if the purpose is to eventually examine effects. Evidence presented in this report tends to indicate that students' perceptions are not an accurate means by which to gather information about whether or not they were in vocational education courses.

- Aggregate data about students who take vocational education courses should be considered largely invalid when investigating the employment and further education effects of secondary vocational education.

  There are major differences in the proportion of students taking various amounts of time in vocational education and taking courses in the various areas of vocational education. The influence of these differences in biasing aggregate data is further aggravated by the substantial differences in employment and further education activities of those taking the different amounts of vocational education and different areas of vocational education. Further, there are major differences in employment and further education activities for students of different sex and high school class rank. The interaction of these factors makes the interpretation of aggregate data very suspect.

- In looking for the employment effects of secondary vocational education, it is at least necessary to consider sex. ability level, vocational education program, amount of time in program, program's purpose and student's reason for being in the program; there is probably not an appropriate control group for comparison with students taking vocational education courses.

The findings presented in this report substantiate the effects or, at least, existence of the potential confounding factors listed in this conclusion. These factors include both student and program characteristics. The evidence presented in support of the previous conclusions is also relevant here. The sheer complexity created by even this short list of factors makes it very difficult to construct fair control groups or simple answers concerning the effects of secondary vocational education.

About the Effects

- Potentially, the purposes of secondary vocational education are useful to students at the secondary school level in Minnesota.

  As stated earlier, the purposes of vocational education at the secondary school level in Minnesota are occupational exploration, preparation for further education, and preparation for employment. Almost two-thirds of former high school students in the sample which was analyzed were working either full or part-time approximately one year after leaving high school. About forty percent of the students were working at least 30 hours per week. About one-half of the students were in further education either full or part-time; about 14 percent were attending post secondary vocational school. It seems that the purposes of secondary vocational education are consistent with what a large share of students do after leaving high school.

- In view of the context, the effects of secondary vocational education are in the direction one would reasonably expect in terms of educational and employment activities after leaving high school.

  The response to Question 10 in the findings chapter of this report provides the most "telling" evidence to support this conclusion based on the quantitative data which were available for analysis. The relationship identified were, in general, consistent and in the anticipated direction given the purposes of the vocational education and the occupational emphases of the areas of vocational education which were analyzed in greater detail. The large effects of confounding factors such as sex, ability level, and

amount of vocational education, as well as the nature of the context in which they interact, made it difficult to decide on how much of an effect in a particular direction was reasonable to expect.

- The analysis provided in this report is not sufficient to make a definitive answer to the question concerning the employment and further education effects of secondary vocational education.

  Although the findings presented here are generally positive with respect to secondary vocational education, there are many remaining aspects to the analysis which must be completed if a definitive answer is to be found. For example, it has been shown that with more time in a particular program area of vocational education, controlling for high school class rank, students are more likely to enter occupations or further education programs related to the selected vocational education program area. However, further analysis (with more students than were available in this study) is needed to find out if those students with more coursework in a vocational education program area received higher wages or entered occupations with higher training requirements. To go one step further, if there is not a difference in wages or type of occupation, is it the fault of the educational program or of the larger society which may restrict opportunities for students during the first year after high school? Or as another example pointing out the need to control for more factors initially, what might be the effects of a parent's occupation on the students who are taking courses in a vocational education program area such as agriculture? These analyses remain undone and therefore the direct, definitive answer often being sought is still beyond reach.

Summary

This report started out by providing evidence concerning the factors which might influence the development of reasonable expectations for the employment and further education effects of secondary vocational education in Minnesota. This evidence is followed by an anslysis of follow-up data from a sample of former high school students to portray the actual employment and further education effects. What is missing is a set of specific

expectations for such effects, with accompanying rationale, which has been accepted by those who practice vocational education in Minnesota. A statement of this kind would provide a set of reasoned criteria and standards necessary as a basis for judgment of adequacy which are to be of any consequence. The description of context, data source, and findings presented in this paper suggest that the development of such a statement would be a challenging endeavor. This challenge implies that, in the case of secondary vocational education, a simple question, "What difference does it make?", does not deserve a simple answer, yet!

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APPENDIX A.
AMOUNT OF VOCATIONAL EDUCATION TAKEN BY SECONDARY SCHOOL STUDENTS

Table 17

Students Taking Various Amounts of Vocational Education in a Single Program Area in Minnesota High Schools -- Class of 1978, One Year Later

Characteristic	Amount of vocational education (hours)[a]								
	1-100	101-200	201-300	301-400	401-500	501-600	601-700	701-800	801-900
Summary data									
Number	4,796	4,683	2,183	3,259	973	1,599	779	356	441
Percent[b]	25.2	24.6	11.4	17.1	5.1	8.4	4.1	1.9	2.3
High school rank percentile (%)[c]									
In upper 25%	23.5	21.0	18.0	16.2	17.5	13.7	12.5	12.8	11.8
In lower 25%	23.0	25.2	25.9	27.7	27.4	28.9	33.4	36.2	28.3
Sex (%)[c]									
Female	48.2	57.3	67.1	61.2	65.8	51.6	49.9	43.8	34.5
Male	51.8	42.7	32.9	38.8	34.2	48.4	50.1	56.2	65.5
Educational activity after one year[c]									
Vocational school	14.8	15.7	16.0	19.3	16.6	19.9	16.6	18.2	23.2
Community college	7.5	6.6	6.0	5.4	5.2	5.2	4.3	5.2	5.2
4 year college	29.1	23.0	18.8	14.6	18.8	12.5	9.6	11.4	6.8
Employment activity after one year (%)[c]									
Paid employment	66.5	69.2	68.4	70.3	70.9	72.8	77.3	73.0	75.2
Unemployed	5.9	6.3	7.3	6.2	5.8	6.1	5.6	5.9	4.4
Paid employment only	37.4	41.6	43.2	45.7	45.8	48.1	56.3	52.4	50.9

Footnotes to Table 17

[a] Students are counted once for each different amount of vocational education which they had taken in a different program area. Therefore, if a student had taken 180 hours of agriculture courses and 360 hours of office courses, he or she would be counted once in the 101-200 hour and once in the 301-400 hour categories of amount of vocational education. On the other hand, if the student had taken 180 hours of agriculture courses and also 180 hours of office courses, the student would be counted only once in the 101-200 hour category (because the amount of time remained within the same category even if it was taken in two different program areas).

[b] Percentages are of the total across all columns shown in the first row; this total is 19,069. This total reflects the multiple counting of students anticipated by the explanation in footnote "a".

[c] Percentages are of the number of students in each column; this number is shown in the first row.

APPENDIX B:
SELECTED RELATED OCCUPATIONS AND EDUCATIONAL MAJORS

Table 18

Selected Related Occupations and Educational Majors

Vocational education program	Related occupations	Related educational majors
Agriculture	Farm equipment mechanics and repairpersons	Agriculture and natural resources
	Lumber workers, rafts workers and wood choppers	
	Gardners and groundskeepers	
	Farmers	
	Farm managers	
	Farm supervisors	
	Farm laborers, wage workers	
	Farm laborers, unpaid family workers	
	Farm service laborers, self-employed	
Office	Bookkeeper	Business and management
	Receptionist	
	Secretary	
	Stenographer	
	Typist	
Trade and industrial	Carpenter	Communications
	Carpenter apprentice	Building and construction
	Electrician	
	Electrician apprentice	Manufacturing
	Machinist	Transportation
	Machinist apprentice	Engineering
	Automobile mechanic	
	Automobile mechanic apprentice	
	Welder	
	Precision machine operative	
	Press workers and plate printers	
	Press worker apprentices	